IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants: Poirrier et al.

Serial No.: 10/599,520

Filed: May 11, 2007

Title: Phototherapy Method and Device

Group Art Unit: 3769

Examiner: Jeffrey B. Lipitz

Docket No. 80119/40360

Customer No.: 29471

APPEAL BRIEF

Mail Stop Appeal Brief-Patent
Commissioner for Patents
P.O. Box 1450
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Sir:

This Appeal Brief is filed in response to the final Office action dated July 13, 2011. A Notice of Appeal was timely filed on August 25, 2011. This Appeal Brief is being timely submitted within two months of filing the Notice of Appeal.

Applicants respectfully request that the Board of Patent Appeals and Interferences reverse the final rejections of claims 1-3, 6-10, and 13-17 of the present application.

(i) REAL PARTY IN INTEREST

The real party in interest is the assignee of the entire, right, title and interest in the application, Constructions Electriques Schréder of Ans, Belgium.

(ii) RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences pending.

(iii) STATUS OF THE CLAIMS

Claims 1-3, 6-10, and 13–17 are pending and at issue in this appeal.

(iv) STATUS OF AMENDMENTS

No amendments have been filed subsequent to final rejection.

(v) SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1, and claims 2, 3, 15, and 16 dependent thereon, recite a phototherapy method acting on a set of eyes 5 of an individual with a head, each eye including a pupil, a retina 11, and a fovea, through light rays of at least one specific wavelength, emitted by at least one light source 3 which is stationary relative to the head of the individual. The phototherapy method includes the step of arranging a light source 3 at a periphery of a field of vision so as to allow usual activities of the individual (see page 4, lines 7-9, page 6 lines 15-18, page 8, lines 4-8, and page 12, lines 1-6 and 11-16 of the substitute specification and FIGS. 1 and 2). The phototherapy method further includes the step of using a diffractive optical element, for example, 19, (page 8, lines 22-27 and FIGS. 1 and 2), to deflect the light rays by diffraction onto a specific zone 9 of a retina 11 so as to maintain vision (see page 11, lines 13-20 and FIG. 2).

Claim 6, and claims 7–10, 14, and 17 dependent thereon, specify a device 1, 3, 7 (see page 5, lines 1-20 and page 6, lines 12-23 and FIG. 1) for implementing a phototherapy method on a set of eyes 5 of an individual with a head, wherein each eye comprises a pupil, a retina 11, and a fovea. The device includes a support 1 (FIG. 1) designed to be immobilized on the head of the individual and at

least one light source 3 mounted on the support at the periphery of a field of vision of the individual (see page 4, lines 7-9, page 6 lines 15-18, page 8, lines 4-8, and page 12, lines 1-6 and 11-16 of the substitute specification and FIGS. 1 and 2). The light source 3 emits light rays of at least one specific wavelength and is arranged so that the light rays are directed into the eyes 5, by deflection means, onto a specific zone of the retina 11. The deflection means is specified as comprising at least one off-axis diffractive optical element 19 for each eye (see page 11, lines 13-20 and FIG. 2).

(vi) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Applicants appeal the rejection of claims 1-3, 6, 7, 9, 10, and 13-17 as obvious over Gerdt, U. S. Patent No. 6,235,046 in view of Potin U. S. Patent No. 6,715,150. Applicants also appeal the rejection of claim 8 as obvious over Gerdt and Potin in conjunction with Goldman U. S. Patent No. 5,923,398.

(vii) ARGUMENT

I. The rejection of claims 1-3, 6, 7, 9, 10, and 13-17 as obvious over Gerdt in view of Potin should be reversed

As an initial matter, Potin is non-analogous art with respect to the rejected claims. A reference qualifies as analogous prior art for testing obviousness of a claimed invention if the reference meets either of two tests. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). Under the first test, the reference disclosure is analogous prior art if it involves the same field of endeavor as the claimed invention. *Id.* The field of endeavor of the claimed invention is determined by analyzing explanations of the inventive subject matter disclosed in the patent application, including the embodiments of the invention, functions, and structure. *Id.*, at 1325-26. Under the second test, the reference disclosure is analogous prior art if it is reasonably pertinent to the particular problem the claimed invention seeks to solve. *Id.*, at 1325. The reference is reasonably pertinent to the problem if the reference deals with subject matter that would logically commend itself to an inventor's attention in considering the problem. *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992). A reference is reasonably pertinent to the same problem as the claimed invention if the reference is directed to the

same purpose as the claimed invention, it being understood that if the reference is directed to a different purpose, the inventor would have less motivation to consider it. *Id.*

The examiner cites Potin as disclosing "an off-axis diffractive optical element or holographic diffraction mask" and alleges that:

> It would have been advantageous to modify the invention of Gerdt with the diffractive mask of Potin because doing so would have enabled the light emitted from the source to be more accurately angularly focused at the eye, and thus, targets within it. In addition, Potin's mask would reduce distortion caused by the large angles associated with the output of the emitters. Moreover, it would have been obvious to modify Gerdit [sic] in view of Potin because both inventors are projecting images and or patterns into the eye.

Applicants respectfully disagree with the contention of the examiner in this regard.

Applicants readily concede that Potin and the subject matter of the rejected claims both deal with optical technology, but this fact alone is insufficient to conclude that Potin is analogous art. Applying the *Bigio* test, the field of endeavor of the subject matter recited by the claims under appeal is the treatment of seasonal affective disorder (SAD) and other disorders resulting from disruptions in the circadian rhythm of a patient using light of a particular wavelength. This field of endeavor deals with precise focusing of light on selected portions of the eye (for example, portions of the retina away from the fovea) while not directing such light on other portions of the eye (for example, the fovea). Specifically:

> [0018] To this end, the present invention proposes a method which consists in arranging the light source at the periphery of the field of vision so as to allow the usual activities of the individual, and in deflecting said light rays onto a specific zone of the retina so as to maintain vision.
>
> [0019] This arrangement is of course advantageously applied to both eyes of the individual to be treated, if these are both able to receive this light in a useful manner.
>
> [0020] In one embodiment of the invention, said zone which receives the deflected rays is selected in such a way as to exclude the fovea regardless of the direction of vision below a plane passing through the optical axes of lenses arranged so as to

deflect the light rays towards said specific zone. Activity therefore remains possible, the fovea being the most sensitive zone of the eye which allows fine vision and analysis of details during the aforementioned semi-sedentary activities.

[0021] Advantageously, the deflected light rays are made to converge in the eye at a point located slightly behind the pupil of the eye. This convergence of the rays entering the eyeball makes it possible to illuminate an extensive surface on the retina, even when the eye changes its direction of vision within the aforementioned limits, and therefore substantially increases the beneficial effect of these rays.

[0022] Preferably, the light rays are deflected by diffraction.

[0023] The present invention also relates to a device for implementing the phototherapy method of the invention.

[0024] According to the invention, the device comprises a support designed to be immobilised on the head, and also the light source(s) mounted on the support at the periphery of the field of vision, emitting light rays of at least one specific wavelength and being arranged so that these rays are directed into the eyes, by deflection means, onto said specific zone. Although white light, without UV or infrared, may be suitable, a selection from blue seems to have a certain benefit. Among other things, an iridescence given by white light, by diffraction, disappears when a colour is selected.

[0025] In one embodiment of the invention, said support consists of a spectacle frame, said deflection means being in the form of spectacle lenses.

[0026] In one preferred embodiment of the invention, said device comprises, for each eye, one or more light sources, such as light-emitting diodes, and separate deflection means which are arranged so as to cooperate with the light source(s) of each eye.

[0027] Advantageously, there is for each light source a condenser which is arranged so as to direct the light rays emitted by each of the sources onto said deflection means, and which is associated with the light source at the periphery of the field of vision.

[0028] Preferably, the deflection means consist of a diffractive lens, such as an off-axis diffractive optical element, for each eye.

...

[0069] The phototherapy method of the invention therefore acts on the eyes 5 through light rays R of at least one specific wavelength, emitted by at least one source 3 which is stationary relative to the head of the individual to be treated. This method consists in arranging the light source 3 at the extreme periphery of the field of vision

so as to allow the usual activities of this individual, and in deflecting said light rays R onto a specific zone 9 of the retina 11, selected so that the individual maintains vision.

[0070] It must be understood that the invention is in no way limited to the embodiments described, and that many modifications may be made thereto without departing from the scope of the claims.

[0071] Thus, said specific zone 9 which receives the deflected rays is selected in such a way as to exclude the fovea 21 regardless of the direction of vision within a range below the plane passing through the optical axis X-X of the lenses 19. Thus the fovea 21, which is the region of the retina 11 that allows fine vision, is not supplied with light by the deflected rays R and therefore remains available for a whole range of activities that do not require the use of peripheral vision (such as reading, working on a screen, movements within a safe environment, etc.).

[0072] In order to optimise said method, the deflected light rays R are made to converge in the eye 5 at a point 23 (actual image of the source) located slightly behind the pupil 20 of the eye 5.

[0073] As a result of this choice, regardless of the angle of inclination of the eye 5 within the specific range given above, the flux is concentrated on the same region of the retina 11 (lower half in the example shown). This results from the convergence of the rays and the relative position of the cornea and of the focus of the lens 19. Specifically, this means that the "apparent" light source moves along with the direction of vision. If the individual lowers his eyes, it is the lower part of the diffractive grating of the lens 19 which performs the deflection. When the individual is looking at the horizon, it is the upper part of the lens 19 that is involved.

[0074] The light rays R (FIG. 2) emitted by the source 3 are spread at R1 in a manner guided in the condenser 15 so as to form a beam at R2, said beam being directed towards the diffractive lens 19. The latter reorients the light rays R to form a beam R3 which converges on the pupil 20 over a zone that is larger than the surface area of the latter. The pupil 20 selects a portion of this zone and allows the passage of a beam R4 that has been deflected by the lenses of the eye (Cornea and crystalline lens) so as to form, beyond the actual image 23 of the source 3, the beam R5 which reaches said specific zone 9 of the retina 11.

Paragraphs 18-28 and 69-74 of the present application.

On the other hand, Potin is involved with a vastly different field of endeavor than the subject matter of the rejected claims. Specifically, Potin deals with aircraft or helicopter cockpit visual

systems in which it is important to provide an undistorted view of surroundings. Potin discloses a helmet having optical correction means for correcting visual distortion caused by multiple spaced visors disposed in front of the eyes of a wearer of the helmet. In particular, Potin explains:

> The present invention relates to helmets with a protective visor and especially those equipped with an optical image-projection system making it possible to display in front of the helmet wearer's eyes, a synthetic image superimposed onto his view of the external world.
>
> ...
>
> [T]he helmet is still equipped with one or more adjustable protective visors, for example, a visor for mechanical protection against wind, dust, etc. and a visor for optical protection against the sun or laser attack. This or these movable protective visors are completely detachable or they retract by pivoting above the helmet wearer's head, passing above the components of the image projection system placed in the forehead region. In order to take up less space when they are moved into place and retracted, it is usual to give the visors a generally spherical shape and to articulate them on the helmet about an axis of rotation placed in the forehead region of the helmet and passing through the center of their sphere. In addition, for ease of manufacture, the visors, which are generally obtained by thermoforming a transparent plastic sheet of uniform thickness, often have a final concentric bispherical shape with a constant thickness and two faces: a spherical and concentric internal face and external face.
>
> The positions of the helmet wearer's eyes are offcentered laterally and downward with respect to the center of the spheres of the external and internal faces of the visors, by angles exceeding 20 degree. These offcenterings mean that the light rays reaching the helmet wearer's eyes pass through the walls of the visors at angles far from the normal and, on passing through these walls, they undergo refraction phenomena causing offsets and image distortions.
>
> Thus, the helmet wearer notices both that the image of the scenery which he can see is offset upward and that this image is distorted when he puts a visor in place.
>
> The offset introduced by a visor varies with the direction in which the helmet wearer looks, since the value of the angle of offcentering depends on this direction. It is about 0.4 degree when he looks straight ahead and rapidly gets worse when he looks sideways or downward. This offset has the drawback of playing on the superposition perceived by the helmet wearer between a synthetic projected image and the scenery that he can see.

Hitherto, the offset and the image distortions due to visors were ignored, the offset since it had no significant effect on the accuracy of the designation systems using a helmet visor and the image distortions since the helmet wearer can be satisfied most

of the time with a reduced visual space by orienting his field of view by displacing his head rather than by displacing his eyes.

With the improvement in accuracy of the designation helmet visor systems, the effect of image offsets due to the presence of the visors on the sighting errors can no longer be ignored.

The offset introduced into the viewing axis by the protective visor or clear visor is easy to take into account. This is because, since this visor is generally kept in the lowered position during the whole mission, it is possible to take into account once and for all the offset that it introduces by an offset in the same direction of the synthetic projected image.

The offset introduced into the viewing axis by the additional optical protective visors is more problematic since the helmet wearer tends to place or retract these visors depending on the lighting conditions encountered or on the laser threats which may be very variable during one and the same mission. If one attempts to compensate for it by offsetting the synthetic projected image in the same direction, this can only be done when these visors are lowered, which means that the positions of these visors must be detectable at all times. This position detection can be obtained by equipping the helmet with visor position sensors, but that is against the general concern of lightening the helmet.

In addition, compensating for the offset of the scenery due to the presence of visors by a similar offset of the synthetic projected image has to be done according to the viewing direction of the helmet wearer since the value of the offcentering angle and therefore of the offset depends thereon. It would be possible to consider detecting the ocular position of the helmet wearer and offsetting the synthetic image by the value observed in the direction sighted by the helmet wearer, but this dynamic correction of the synthetic image is difficult to receive by the helmet wearer who sees a synthetic image which seems to undulate with the direction in which he looks.

Compensation only of the offset means that the image distortion due to the visors is not corrected, which is moreover particularly problematic for night or infrared viewing systems since it leads to poor superposition of the synthetic image with the scenery perceived through the visor. In order to improve this superposition, it would be possible to consider making the synthetic image subject to a similar distortion by image processing, but that would require the introduction of much too heavy optical or digital correction means on the helmet.

> The aim of the present invention is to combat the aforementioned drawbacks by acting on the optical properties of the protective visors.
>
> The subject of the invention is a protective visor for a helmet with a transparent wall having two faces, one internal, the other external, of generally spherical shape remarkable in that it comprises optical means for reducing angular offsets perceived through it by the helmet wearer.
>
> ...
>
> Advantageously, said optical correction means consist of a holographic diffraction mask affixed to one of the faces of the visor and determined so as to equalize the direction, at every point of impact on the visor, of the light rays collected by the helmet wearer's eyes, before and after they have passed through the visor.
>
> Advantageously, the holographic diffraction mask is affixed to the external face of the visor.

Potin, column 1, line 3 - column 4, line 41.

The field of endeavor of Potin deals with projecting images in an undistorted manner on the retinas so that the image can be properly perceived by a wearer of a helmet. This is totally unlike the field of endeavor disclosed in the present application which is the treatment of disorders using light. There simply is no connection between these fields of endeavor.

Further, Potin is not reasonably pertinent to the particular problem the claimed invention seeks to solve. This because and the subject matter recited by the rejected claims and Potin are directed to substantially different purposes. The purpose of the rejected subject matter is to treat a subject using light directed by a diffractive optical element onto specific portions of the eye while avoiding, for example, the fovea, whereas the purpose of the Potin device is to use a "holographic diffraction mask" to focus light onto any or all areas of the retinas to reduce or eliminate visual distortion experienced by a wearer of a helmet. In this regard, Potin discloses the redirection of all light rays incident on the visor in a manner so as to "equalize the direction" of the light rays.

Accordingly, the purpose of the device disclosed in Potin is completely unlike the purpose of the device disclosed in the present application.

For the foregoing reasons, Potin comprises non-analogous art not properly cited by the examiner to reject the claims. Accordingly, the rejections of the claims involving Potin should be reversed.

In addition, there is no teaching, suggestion, or motivation to combine elements found in Potin with those disclosed by Gerdt. While rigid reliance on the "TSM test" has been disavowed by the CAFC in *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), the courts have recognized that the test can be a useful indicator of the non-obviousness of a claimed combination of elements.

In the present application, Gerdt is directed to the problem of directing rays of light at specific points or areas of a person's retinas to treat disorders resulting from disturbances in the internal circadian rhythm of the person. Gerdt, however, fails to disclose or suggest a diffractive optical element (DOE), which is recited by all of the claims of the present application.

It is clear that the teaching of Potin is to provide a visor with shapes that have been modified to minimize optical distortions perceived by a wearer of a helmet including such a visor. In only one embodiment for providing a modified shape is a holographic diffraction mask fixed to one of the faces of the visor. The holographic mask is described at column 10, line 57 to column 11, line 22 and it is clearly stated that: "the hologram records the perturbation caused by the visor on the light rays reaching the eye of the helmet wearer, with an opposite sign because of the real and imaginary complementary natures of the source points" (column 10, lines 62 to 67). There is no teaching or suggestion that the holographic mask is used to direct light into the eye of the helmet wearer or that the light is focused by this hologram

Moreover, as noted above, the motivation disclosed by Potin to use the "holographic diffraction mask" is to correct for distortions due to the use of multiple visors. This motivation is wholly unlike the motivation identified by the examiner. The diffraction mask of Potin does not focus light rays, but, instead, redirects the incident light rays to reduce distortion. The diffraction mask of Potin also does not project patterns into the eyes of the user, contrary to the contention of the

examiner. Importantly, combining the "holographic diffraction mask" of Potin with the apparatus of Gerdt would result in a device that would be inoperable to accomplish the function recited by the claims at issue. In such a circumstance, the "holographic diffraction mask" of Potin would, at most, "equalize the direction" of the rays of light used in the device of Gerdt. This is not the same result as the subject matter recited by the claims at issue, in which light rays are directed onto specific areas in the eye while, for example, avoiding the fovea.

There is no teaching or suggestion in Potin that the light is focused by any means other than the eye itself. There would simply be no expectation of success, and therefore no motivation for one of ordinary skill in the art, to combine features of Gerdt and Potin to arrive at the claimed subject matter, as suggested by the examiner, because Gerdt and Potin are directed to solving different problems. Even if it is accepted that, in Gerdt, the light source is arranged around "the periphery of the field of vision so as to allow the usual activities of the individual," there is no motivation to combine such disclosure with the teachings of Potin, which is attempting to correct vision due to offset of the spherical surfaces of a visor.

Indeed, the disclosures of Gerdt and Potin teach away from the examiner's proposed combination. Though the examiner prefers to focus on modifying "the invention of Gerdt with the diffractive mask of Potin because doing so would have enabled the light source to be more accurately focused at targets in the eye," "a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP § 2141.02 VI (citing *W.L. Gore & Associates, Inc.* v. *Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied,* 469 U.S. 851 (1984)). In this regard, Potin does not disclose taking the light source from around the periphery of the field of vision "to solve the problem introduced by the eyes of the user being offset relative to the center of the spherical internal faces of the visor." (Office action dated February 25, 2011, at 3) There is no motivation to combine the teachings of Potin that does not take the light source from around the periphery of the field of vision with a document that does. In fact, if the light from around the periphery of the field of vision were used in Potin, it is believed by the applicants that it would not be possible to solve the problem addressed by Potin of

filling in the gap in illumination that is caused by the visor thereof or "to deflect said light by diffraction onto a specific zone of the retina so as to maintain vision" as specified by claim 1 and claims 2, 3, 15, and 16 dependent thereon. Similar arguments also apply in relation to claim 6 and claims 7, 9, 10, 13, 14, and 17 dependent thereon.

For the reasons presented above, Potin is not properly combinable with Gerdt to reject the claims at issue and the rejections based thereon should be reversed.

II. The rejection of claim 8 as obvious over Gerdt in view of Potin and Goldman should be reversed.

Goldman does not address the issues noted above concerning the non-analogous nature of Potin, and the non-combinability of Potin with Gerdt to reject the remaining claims of the application. Goldman only teaches spectacle attachments that may be attached to the glasses of a wearer. Goldman fails to disclose or suggest a diffractive optical element of any kind. Also, Potin should be considered non-combinable with Goldman for the same reasons presented above with respect to the non-combinability of Potin with Gerdt.

III. Conclusion

All of the pending rejections having been fully addressed and rebutted herein, reversal of the pending rejections and allowance of the claims at issue are requested.

Respectfully submitted,

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October 25, 2011

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(viii). CLAIMS APPENDIX

1. Phototherapy method, acting on a set of eyes of an individual with a head, each eye comprising a pupil, a retina and a fovea, through light rays of at least one specific wavelength, emitted by at least one light source which is stationary relative to the head of the individual, wherein the method comprises the steps of:

arranging the light source at the periphery of the field of vision so as to allow the usual activities of the individual; and

using a diffractive optical element to deflect said light rays by diffraction onto a specific zone of the retina so as to maintain vision.

2. Method according to Claim 1, wherein said limited zone which receives the deflected rays is selected in such a way as to exclude the fovea regardless of the direction of vision below a plane passing through the optical axis of lenses arranged so as to deflect the light rays towards this limited zone.

3. Method according to Claim 1, characterised in that the deflected light rays are made to converge in the eye at a point located slightly behind the pupil of the eye, but before the retina.

6. Device for implementing a phototherapy method on a set of eyes of an individual with a head, each eye comprising a pupil, a retina and a fovea, and comprising:

a support designed to be immobilised on the head of the individual;

at least one light source mounted on the support at the periphery of a field of vision of the individual, emitting light rays of at least one specific wavelength and being arranged so that the latter are directed into the eyes, by deflection means, onto a specific zone of the retina; and

wherein said deflection means comprises at least one off-axis diffractive optical element for each eye.

7. Device according to Claim 6, wherein said support consists of a spectacle frame, said deflection means being in the form of spectacle lenses.

8. Device according to Claim 6, wherein the support comprises a spectacle frame with corrective lenses and a spectacle attachment, said deflection means being in the form of lenses of said attachment, the at least one light source being mounted on this attachment.

9. Device according to Claim 6, wherein the device further comprises, for each eye, one or more light sources, and separate deflection means which are arranged so as to cooperate with the light sources of each eye.

10. Device according to Claim 9, wherein the device further comprises, separately for each light source, a condenser:

which is arranged so as to direct the light rays emitted by each of the sources onto said deflection means; and

which is associated with the light source at the periphery of the field of vision.

13. Device according to Claim 10, wherein the condenser for the light rays is arranged so as to direct said rays onto the face of the corresponding off-axis diffractive optical element at an angle of incidence, with respect to the optical axis of this off-axis diffractive optical element, provided such that the distance separating the latter from the eye is such that the actual image of the light source is located in the eye, slightly behind the pupil thereof, but before the retina.

14. Device according to Claim 6, characterised in that an F number of the diffractive optical element of around 0.7 is selected.

15. Method according to claim 2, characterised in that the deflected light rays are made to converge in the eye at a point located slightly behind the pupil of the eye, but before the retina.

16. Method according to claim 1, wherein said specific zone of the retina is below the fovea.

17. Device according to claim 6, wherein said specific zone of the retina is below the fovea.

(ix). EVIDENCE APPENDIX

None.

(x). RELATED PROCEEDINGS APPENDIX

None.